



ISSN: 2091-2749 (Print)  
2091-2757 (Online)

#### Correspondence

Dr. Surendra Shah  
Dept. of Surgery  
Patan Hospital, Patan Academy  
of Health Sciences, Lalitpur,  
Kathmandu, Nepal  
Email:  
drsurendrashah@gmail.com

#### Peer Reviewers

Prof. Dr. Ganesh Dangal  
Kathmandu Model Hospital

Prof. Dr. Nabees MS Pradhan  
School of Medicine, Patan  
Academy of Health Sciences

#### Submitted

9 Sep 2020

#### Accepted

20 Oct 2020














#### How to cite this article

Surendra Shah, Sanjay Paudyal,  
Shantabir Maharjan, Samir  
Shrestha, Shailendra Shah,  
Niraj Giri, et al. Outcome of  
gastrointestinal surgery during  
COVID-19 lockdown in a  
tertiary care hospital, Nepal.  
Journal of Patan Academy of  
Health Sciences.  
2020Dec;7(3):6-12.

#### DOI:

<https://doi.org/10.3126/jpahs.v7i3.33819>

## Outcome of gastrointestinal surgery during COVID-19 lockdown in a tertiary care hospital, Nepal

Surendra Shah<sup>1</sup>  , Sanjay Paudyal<sup>2</sup> , Shantabir Maharjan<sup>3</sup> , Samir Shrestha<sup>3</sup> , Shailendra Shah<sup>4</sup> , Niraj Giri<sup>4</sup> , Upendra Bhandari<sup>4</sup> , Samyukta KC<sup>4</sup> , Saroj Babu Pradhan<sup>4</sup> , Suyog Bhandari<sup>4</sup> , Erena Pradhan<sup>4</sup> , Jay Narayan Shah<sup>2</sup> 

<sup>1</sup>Asst. Prof., <sup>2</sup>Prof., <sup>3</sup>Assoc. Prof., <sup>4</sup>Lecturer, Dept. of Surgery, Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Kathmandu, Nepal

### Abstract

**Introduction:** Perioperative strategies have been changing due to the COVID-19 pandemic to prevent the risk of postoperative complications and transmission of infection. This study was aimed to assess the outcome of gastrointestinal surgery and the risk of transmission by implementing COVID-19 testing criteria and surgical strategy.

**Method:** This was a retrospective descriptive study conducted at the department of surgery at Patan Hospital, Nepal, during COVID-19 lockdown from 24 March to 15 June 2020. All patients who underwent gastrointestinal (GI) surgery were included. High-risk patients (as defined by the Hospital Incident Command System, HICS) were tested for COVID-19 preoperatively. Surgery was performed in COVID operating room with full protective gear. Low-risk patients were not tested for COVID-19 preoperatively and performed surgery in non-COVID OR. Data from patient's case-sheets were analyzed descriptively for age, gender, comorbidities, hospital stay, RT-PCR results, surgeries, and postoperative complications.

**Result:** There were total 44 GI surgeries performed; 31(70.5%) were emergency, 5(11.3%) semi-emergency and 8(18.2%) oncology. There were 11(25%) patients tested for COVID-19 preoperatively and were negative. Nine HCWs tested for COVID-19 randomly were negative. Severe postoperative complications developed in 3 patients, with one mortality.

**Conclusion:** Among GI surgeries, there was no increase in postoperative complications and transmission of COVID-19 to the patients or HCWs following the implementation of standard testing criteria and surgical strategy.

**Keywords:** COVID-19, gastrointestinal surgery outcome, lockdown

## Introduction

Global health including surgical care has been disrupted due to the COVID-19 pandemic. Therefore, guidelines for the management of surgical patients have been developed from societies of several countries.<sup>1-3</sup> International study group including neighboring country China showed an increased risk of pulmonary complications and mortality after surgery in COVID-19 patients.<sup>4,5</sup>

Routine preoperative screening with RT-PCR on the day before surgery for COVID-19 is suggested to minimize the increased risk of morbidity and mortality.<sup>6</sup> However, the true benefit of preoperative screening depends on the local prevalence of COVID-19.<sup>1</sup> Government of Nepal declared lockdown on 23 March 2020 when there was the detection of the second case of COVID-19 who had traveled from France.<sup>7</sup>

The testing criteria for COVID-19 and surgical strategies have been developed by the Hospital Incident Command System (HICS) of Patan Hospital, Patan Academy of Health Sciences (PAHS).<sup>8</sup> There is a lack of studies from Nepal (PubMed, Google Scholar, and NepJOL) on postoperative outcomes after surgery in COVID-19 patients. This study aimed to assess the outcome of gastrointestinal (GI) surgery patients by implementing testing criteria for COVID-19 and surgical strategy at Patan Hospital during the lockdown.

## Method

This was a retrospective descriptive study conducted in the department of surgery, Patan Hospital, PAHS, Nepal, from 24 March 2020 to 15 June 2020. All the patients who underwent gastrointestinal surgery during the study period were included in the study. Case-sheets were retrieved from the medical record section using the hospital number. All data (age, gender, diagnosis, comorbidities (hypertension, diabetes, chronic obstructive pulmonary disease (COPD), hospital stay, real-

time reverse transcriptase-polymerase chain reaction (RT-PCR) status of suspected patients and health care workers (HCW), name of the surgery and postoperative complications were recorded from the patient's case-sheets. Patients with missing data in the case-sheets were excluded from the study. Approval for the study was obtained from the Institutional Review Committee of PAHS.

The objective of the study was to evaluate the outcome of gastrointestinal surgery during the COVID-19 lockdown in Nepal. Outcome variables included intraoperative, early postoperative complications, mortality during the hospital stay, PCR positive COVID-19 patients, and HCWs after implementing COVID-19 testing criteria and surgical strategies in the hospital. Descriptive analysis was performed using Microsoft Excel.

We followed the testing criteria of RT-PCR for COVID-19 as per HICS.<sup>8</sup>

For patients-

- i. Patients with fever and belongs to the area where community outbreak is documented or no localizing symptoms that explain the alternative diagnosis,
- ii. All patients coming from areas where community outbreak is documented or coming from out of the valley,
- iii. Respiratory symptoms AND does not have travel history outside the valley within the last 28 days AND are not in contact with any person who has travelled outside Kathmandu Valley.

For health care workers (HCWs)-

- i. Those involved in surgery of patients (who have not suspected or confirmed COVID-19) without personal protective equipment (PPE) and patients detected as a COVID-19 post-operatively,
- ii. The HCWs involved in surgery of suspected or confirmed COVID-19 patients who have breached protective measures or developed respiratory

symptoms. Irrespective of the above criteria, random RT-PCR testing of HCWs were done in all departments.

- iii. The HCWs who met the above criteria were quarantined and tested with RT-PCR on the 7<sup>th</sup> day of exposure.

The strategy that was followed by all the surgical departments at Patan Hospital, PAHS, Figure 1.

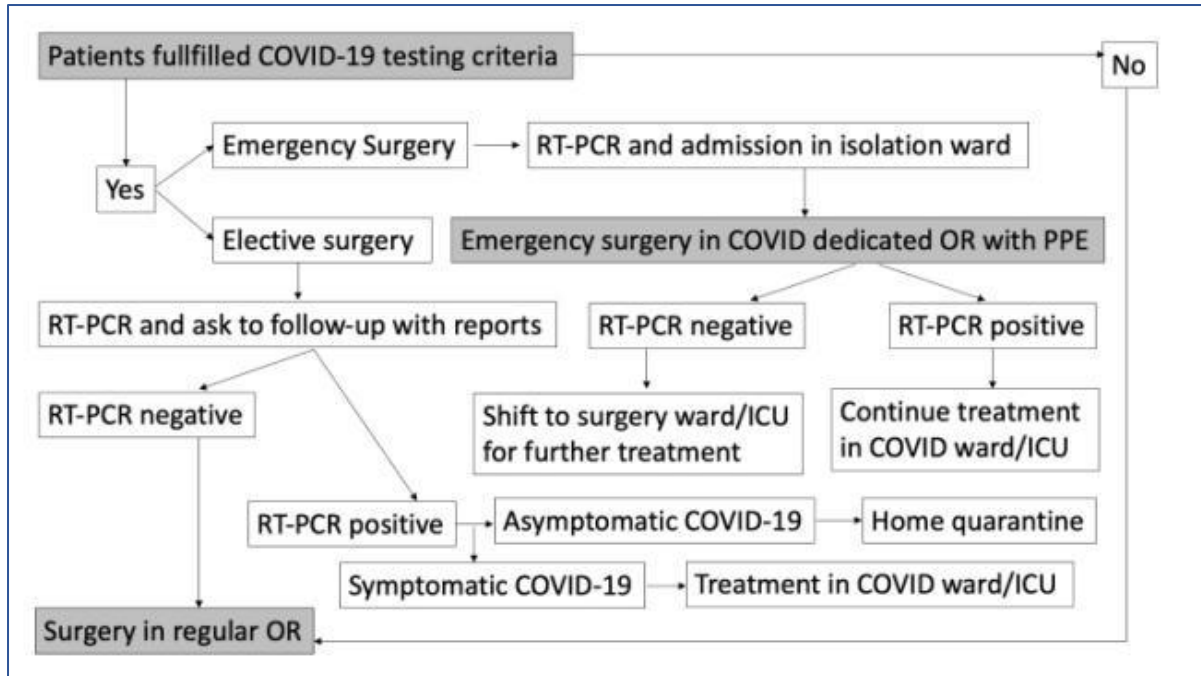


Figure 1. Surgical strategy at Patan Hospital, PAHS during COVID-19 lockdown period

Note: OR = Operating Room, RT-PCR = Reverse Transcriptase Polymerase Chain Reaction, PPE = Personal Protective Equipment, ICU = Intensive Care Unit.

## Result

There were 44 gastrointestinal surgeries performed during COVID-19 lockdown which included 22 males and 22 females. The mean age was 37 y, range from 8 to 76. There were 31(70.5%) emergency, 5(11.3%) semi-emergency and 8(18.2%) GI Oncologic surgery cases performed, Table 1. Duration of surgery (mean) was 123 min (range from 40 to 600 min) and mean hospital stay was 8 d (range 1 to 31).

Diabetes mellitus was present in 2-patients and hypertension in 3-patients which were controlled with medications. There were 11(25%) patients who fit in testing criteria for COVID-19 according to the definition of HICS and 33(75%) patients did not fit in testing criteria. Those who fit into testing criteria

(25%) were emergency surgery cases. They were admitted to the isolation ward through the COVID-19 emergency. Their RT-PCR was done preoperatively. These high-risk patients were operated on in the COVID operation room (OR) with full PPE without waiting for RT-PCR reports. None of the high-risk patients (11 i.e., 25%) tested positive for RT-PCR. The remaining patients (33 i.e., 75%) were operated on without RT-PCR in non-COVID OR, Figure 2.

The RT-PCR testing for COVID-19 was performed in 9 HCWs out of 19 involved in surgeries during the study period (based on a random selection by HICS for testing RT-PCR) and tests were negative for all. There was no intraoperative complication with high-risk or low-risk cases. Severe postoperative complications (Clavien Dindo  $\geq 3$ ) developed in

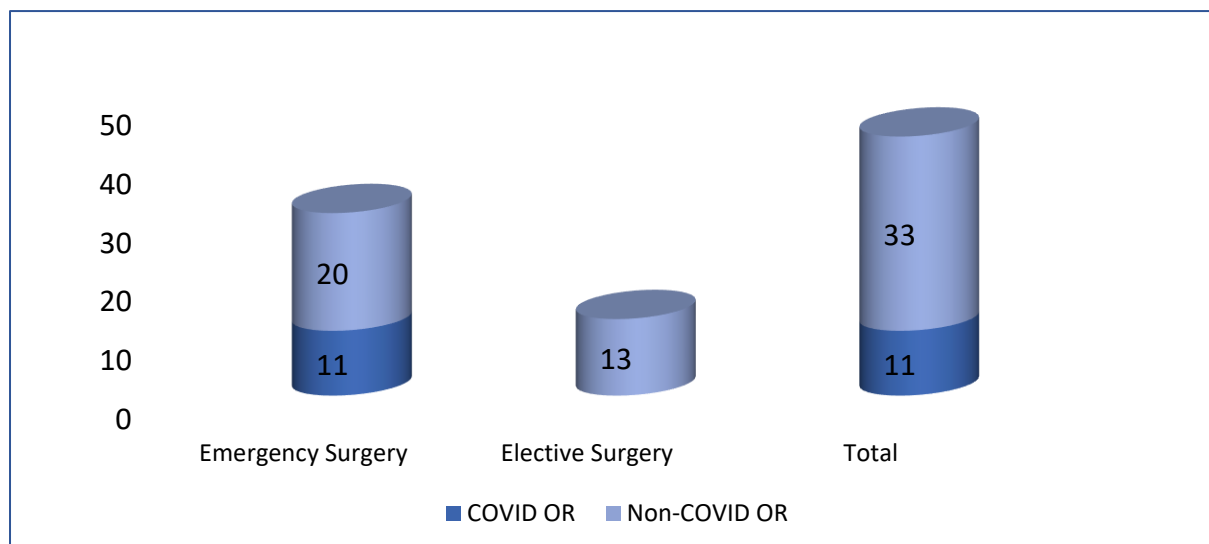
3-cases, including 1(2.3%) mortality. Mortality occurred in a case of gallbladder perforation peritonitis with septic shock and multiple organ dysfunction (acute renal failure, coagulopathy with increased prothrombin time, and pneumonia). This patient was resuscitated in COVID ICU and performed open cholecystectomy and peritoneal lavage after resuscitation. Wound

dehiscence (burst abdomen) developed in one and had re-surgery under general anesthesia for retention suture of the abdominal wound. One had an anastomotic leak after right hemicolectomy following ileo-ileocolic intussusception. This patient required re-laparotomy for peritoneal lavage and ileostomy, Table 2.

**Table 1. Gastrointestinal surgeries performed at Patan Hospital, PAHS during COVID-19 lockdown, N= 44**

Diagnosis	Name of Surgery	N(%)
<b>Emergency/semi-emergency</b>		<b>31(70.5%)</b>
Acute appendicitis	Open appendectomy	19(43.2%)
Duodenal perforation peritonitis	Graham's patch repair	2(4.5%)
Giant duodenal perforation peritonitis	Graham's patch + pyloric exclusion + GJ	1(2.3%)
Ileal perforation peritonitis	Primary repair	2(4.5%)
Small bowel obstruction (postoperative)	Exploratory laparotomy + band release	2(4.5%)
Appendicular perforation peritonitis	Exploratory laparotomy + appendectomy	2(4.5%)
Meckel's diverticular perforation peritonitis	Exploratory laparotomy + wedge resection	1(2.3%)
Gallbladder perforation peritonitis	Exploratory laparotomy + cholecystectomy	1(2.3%)
Ileo-ileo-colic intussusception	Right hemicolectomy with ileal resection	1(2.3%)
<b>Semi-emergency surgery</b>		<b>5(11.3%)</b>
Status ileostomy	Ileostomy closer (take-down)	2(4.5%)
Acute biliary pancreatitis	Laparoscopic cholecystectomy	1(2.3%)
Acute calculus cholecystitis	Open cholecystectomy (OC)	1(2.3%)
Gallstone with CBD (failed ERCP)	OC with choledocholithotomy	1(2.3%)
<b>GI oncologic surgery</b>		<b>8(18.2%)</b>
Distal gastric cancer	D2 subtotal gastrectomy	2(4.5%)
Locally advanced gastric cancer with GOO	Gastro-jejunostomy	1(2.3%)
Periampullary cancer	Pancreatico-duodenectomy	2(4.5%)
Gallbladder cancer	Extended Cholecystectomy	2(4.5%)
Cystic neoplasm of the pancreas	Extended pancreatico-duodenectomy	1(2.3%)

GJ = Gastrojejunostomy, CBD = Common bile duct, ERCP = endoscopic retrograde cholangio-pancreatography, GOO = Gastric outlet obstruction



**Figure 2. Type of surgery performed in COVID and non-COVID operation room (OR) at Patan Hospital, PAHS during COVID-19 lockdown, N=44**

**Table 2. Intra- and post-operative complications of GI surgery at Patan Hospital, PAHS during COVID-19 lockdown**

Post-operative complications	Clavien-Dindo	N(%)
Wound dehiscence	3	1(2.3%)
Anastomotic leak	3	1(2.3%)
Multiorgan dysfunction	5	1(2.3%)
Duodenal stump leak	2	1(2.3%)
Mild intraluminal PPH	2	1(2.3%)
Pneumonia	2	2(4.6%)
Superficial surgical SSI	2	2(4.6%)
ISGPS Grade-B POPF	2	1(2.3%)

GI= gastrointestinal, PPH = post-pancreaticoduodenectomy hemorrhage, SSI = surgical site infection, ISGPS = International Study Group for Pancreatic Surgery, POPF = postoperative pancreatic fistula

## Discussion

There were 2(4.54%) pulmonary complications (pneumonia) and 1(1.27%) mortality among 44 patients during the postoperative period. None of them were positive for COVID-19. An international, multicenter observational cohort study from 235 hospitals in 24 countries among patients with COVID-19 showed 51.2% pulmonary complications and 7-days mortality of 5.2% and 30-days overall mortality of 23.7%.<sup>10</sup>

Tracheal intubation and surgical procedures are prone to generate aerosol. Close contact for a prolonged period in OR further exposes HCWs to the transmission of COVID-19. Close contact increases the risk of transmission of COVID-19 to other patients in the ward.<sup>10,11</sup> Surgery in COVID-19 patients is associated with an increased risk of postoperative complications, particularly pulmonary complications, which may increase morbidity and mortality. Therefore, preoperative testing for COVID-19 in surgical patients is recommended.<sup>11,12</sup>

Routine preoperative testing for COVID-19 was not performed in our institute during the study period. We followed a protocol developed by HICS at Patan Hospital, PAHS. According to hospital protocol, only 11(25%) patients in the isolation ward required preoperative testing and none of them were diagnosed as COVID-19. The remaining 33(75%) patients did not qualify for RT-PCR testing criteria for COVID-19 and none of

them developed COVID-19 during the hospital stay.

Similarly, none of the HCWs involved in surgeries were infected during our study. This could be because of a low level of the outbreak and community transmission of COVID-19 in Nepal during the study period compared to other countries.<sup>9,10</sup> The COVID-19 outbreak was not at its peak in Nepal during this study period. COVID-19 was first diagnosed on 23<sup>rd</sup> January 2020 in Nepal in a student who returned from Wuhan, China on 5 January 2020.<sup>13</sup> Second case of COVID-19 was diagnosed on 23 March 2020 in a woman who had returned from France on 17 March 2020. After this, the Government of Nepal declared lockdown in the country and started different measures to contain COVID-19.<sup>7</sup> Quarantine, lockdown and isolation have been used in pandemics and shown to be useful a measure with coordinated and comprehensive approach to controlling the transmission.<sup>14,15</sup> However, cases of COVID-19 increased gradually in 57 districts out of 77 by the end of May 2020, and 1572/69587 cases (prevalence rate of 2.25%) were diagnosed as COVID-19. Most districts had sporadic cases in persons who had a travel history from abroad and districts bordering India in the southern plains of Nepal.<sup>16</sup> Nepal and India have an open border.

The role of selective preoperative testing for COVID-19 needs to be re-evaluated when the outbreak is at its peak. Because the majority of COVID patients are asymptomatic and asymptomatic patients cannot be detected



without testing for COVID-19.<sup>16-18</sup> So, there was a possibility of not detecting patients and HCWs with asymptomatic COVID-19 infection during our study period.

Because of the COVID-19 pandemic, there has been a postponement and restriction for elective surgery. However, prioritization has been given for oncology and emergency surgeries.<sup>19</sup> Surgeries have also been postponed for inpatients with comorbidities such as diabetes mellitus, hypertension, lung diseases, obesity that could increase morbidity and mortality in COVID-19 infection.<sup>20</sup> Our study also showed that most of the surgeries performed were emergency (70.5%), semi-emergency (11.3%), or GI malignancies (18.2%).

In our study, diabetes mellitus and hypertension were present in only two and three patients respectively which were controlled with medication.

The limitation of the study was that selective testing for COVID-19 and random testing of HCWs might have missed asymptomatic COVID cases.

## Conclusion

There were no increased intraoperative and postoperative complications due to COVID-19. We did not find the transmission to HCW or patients after implementing selective preoperative testing criteria and surgical strategy implemented by the hospital incidence command system. Further study would be needed to assess the role of preoperative testing for COVID-19 if community transmission peaks in Nepal.

## Conflict of Interest

None

## Funding

None

## Author Contribution

Concept, design, planning, accountability of the work - SS, SP, SM, SS, SS, NG, UB, SKC, SBP, SB, EP, JNS. Literature review, data collection/ analysis - draft manuscript - SS. Revision and final manuscript - SS, JNS.

## Reference

1. Søreide K, Hallet J, Matthews JB, Schnitzbauer AA, Line PD, Lai PB, et al. Immediate and long-term impact of the COVID-19 pandemic on delivery of surgical services. *Br J Surg.* 2020;107(10):1250-61. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
2. American College of Surgeons. Covid 19: elective case triage guidelines for surgical care. | [Weblink](#) |
3. Moletta L, Pierobon ES, Capovilla G, Costantini M, Salvador R, Merigliano S, Valmasoni M. International guidelines and recommendations for surgery during COVID-19 pandemic: a systematic review. *Int J Surg.* 2020;79:180-8. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
4. Myles PS, Maswime S. Mitigating the risks of surgery during the COVID-19 pandemic. *Lancet.* 2020;396(10243):2-3. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
5. Lei S, Jiang F, Su W, Chen C, Chen J, Mei W. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. *EclinicalMedicine.* 2020;21:100331. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Full Text](#) | [Weblink](#) |
6. Nahshon C, Bitterman A, Haddad R, Hazzan D, Lavie O. Hazardous postoperative outcomes of unexpected COVID-19 infected patients: a call for global consideration of sampling all asymptomatic patients before surgical treatment. *World J Surg.* 2020;44(8):2477-81. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
7. Shrestha R, Shrestha S, Khanal P, KC B. Nepal's first case of COVID-19 and public health response. *J Travel Med.* 2020;27(3):taaa024. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Full Text](#) | [Weblink](#) |
8. Adhikari S, Rijal S, Acharya PK, Sharma BP, Ansari I, Rajbhandari P, Thapa P. Hospital incident command system, the pillar of COVID-19 outbreak response: an experience from Patan Hospital, Nepal. *J Patan Acad Health Sci.* 2020;7(1):80-4. | [DOI](#) | [Google Scholar](#) | [Full Text](#) | [Weblink](#) |

9. Reliefweb. COVID-19: Nepal response situation report no XI, As of 15 June, 2020. ReliefWeb. 2020 Jun 15. | [Weblink](#) |
10. COIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet*. 2020;396:(10243):27-38. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
11. Blouhos K, Boulas KA, Paraskeva A, Triantafyllidis A, Nathanailidou M, Hatzipourganis K, Hatzigeorgiadis A. Understanding surgical risk during COVID-19 pandemic: the rationale behind the decisions. *Front Surg*. 2020;7:33. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |
12. Kraft M, Pellino G, Jofra M, Sorribas M, Solís-Peña A, Biondo S, Espín-Basany E. Incidence, features, outcome and impact on health system of de-novo abdominal surgical diseases in patients admitted with COVID-19. *Surgeon*. 2020;S1479:e1-6. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Full Text](#) |
13. Poudel K, Subedi P. Impact of COVID-19 pandemic on socioeconomic and mental health aspects in Nepal. *Int J Soc Psychiatry*. 2020;66(8):748-55. | [DOI](#) | [PubMed](#) | [Google Scholar](#) |
14. Shah JN, Shah J, Shah J. Quarantine, isolation and lockdown: in context of COVID-19. *JPAHS*. 2020 May 8;7(1):48–57. | [DOI](#) | [Google Scholar](#) | [Full Text](#) |
15. Piryani RM, Piryani S, Shah JN. Nepal's response to contain COVID-19 infection. *J Nepal Health Res Counc*. 2020;18(1):128-34. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Full Text](#) |
16. Dhakal S, Karki S. Early epidemiological features of COVID-19 in Nepal and public health response. *Front Med*. 2020;7:524. | [DOI](#) | [PubMed](#) | [Google Scholar](#) |
17. Day M. Covid-19: four fifths of cases are asymptomatic, China figures indicate. *BMJ*. 2020;369:m1375. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Full Text](#) | [Weblink](#) |
18. Nishiura H, Kobayashi T, Miyama T, Suzuki A, Jung SM, Hayashi K, et al. Estimation of the asymptomatic ratio of novel coronavirus infections (COVID-19). *Int J Infect Dis*. 2020;94:154-5. | [DOI](#) | [PubMed](#) | [Google Scholar](#) |
19. Mariani NM, Ceretti AP, Fedele V, Barabino M, Nicastro V, Giovenzana M, Scifo G, De Nicola E, Opocher E. Surgical strategy during the COVID-19 pandemic in a University Metropolitan Hospital in Milan, Italy. *World J Surg*. 2020;44(8):2471-6. | [DOI](#) | [PubMed](#) | [Google Scholar](#) |
20. Cárdenas-Camarena L, Bayter-Marin JE, Durán H, Hoyos A, López-Romero CO, Robles-Cervantes JA, Echeagaray-Guerrero EE. Elective surgery during SARS-Cov-2/COVID-19 pandemic: safety protocols with literature review. *Plast Reconstr Surg Glob Open*. 2020;8(6):e2973. | [DOI](#) | [PubMed](#) | [Google Scholar](#) | [Weblink](#) |